TTL - χ(t) Model (2025)

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I. TOPOLOGICAL TRAIT OF THE LIMIT

TTL ≡ $\chi(t) = C(t) / L(t)$

II. THEORIES

PDL - lim(TTL)

Ξ^{+} - C_e / L_e

$\Sigma\ll$ - $\chi(t \rightarrow o)$

AS - χ^{r}

III. DISCIPLINES

1. PHYSICS

Quantum-relativistic transition

$\chi(t) = C/L$; $C \rightarrow L \rightarrow C(t+\Delta)$

Vacuum energy (U_x^v)

$U_x^v = f(C \gg 1 ; L \rightarrow 0)$

Quantum fluctuations ($U_{x\varphi}$)

$U_{x\varphi} = f[\Delta\chi(t)]$

Entanglement (U_x^e)

$U_x^e = f(C \parallel L_0)$

Information as physical quantity (U_x^i)

$U_x^i = f[\Xi(C \leftrightarrow L)]$

Event horizon / Black holes (U_x^h)

$U_x^h = f(C \rightarrow 0 ; L \rightarrow \infty)$

Primordial inflation (U_{xi})

$U_{xi} = f[\Delta\chi(t \rightarrow 0)]$

Einstein field equations

$G_{\mu\nu} + \Lambda g_{\mu\nu} = (8\pi G/c^4)\, T_{\mu\nu}$

TTL = χ(t) = C/L

Schrödinger equation

$i\hbar\, \partial\psi/\partial t = \hat{H}\psi$

TTL = χ = C(t)/L(t)

Yang-Mills equation

$D_\mu F^{\mu\nu} = J^{\nu}$

$\boldsymbol{TTL = \chi = C \| L_0}$

2. MATHEMATICS

Riemann hypothesis (ζ)

$\zeta(s) = 0 \rightarrow \mathrm{Re}(s) = 1/2$

$\boldsymbol{TTL = \chi \rightarrow 1/2}$

Navier-Stokes

$\rho(\partial u/\partial t + u\cdot\nabla u) = -\nabla p + \mu\nabla^2 u$

$\boldsymbol{TTL = \chi = \Delta C/\Delta L}$

General topology

$\pi_1(X) \longrightarrow \pi_1(Y)$

$\boldsymbol{TTL = \chi = C \rightarrow C'}$

3. BIOLOGY

Lotka-Volterra

$dx/dt = \alpha x - \beta xy$; $dy/dt = \delta xy - \gamma y$

$\boldsymbol{TTL = \chi = C/L}$

Hodgkin-Huxley

$C_m\, dV/dt = -\sum I_i$

$\boldsymbol{TTL = \chi = C_m/L_i}$

Protein folding

$\Delta G = \Delta H - T\Delta S$

$\boldsymbol{TTL = \chi = \Delta C/\Delta L}$

4. ECONOMY

Solow model

$\dot{s} = f(k) - (n+\delta)k$

TTL = χ = C_prod/L_dep

Black-Scholes

$\partial V/\partial t + \frac{1}{2}\sigma^2 S^2 \partial^2 V/\partial S^2 + rS\partial V/\partial S - rV = 0$

TTL = χ = C_vol/L_r

Supply–Demand

$Q_d = a - bP$; $Q_s = c + dP$

TTL = χ = C/L

5. SYSTEM THEORY

Control theory

$\dot{x} = Ax + Bu$

TTL = χ = C/L

Lyapunov stability

$\dot{V}(x) \leq 0$

TTL = χ → 0

Cybernetics

$O = f(S,R)$

TTL = χ = C/L

6. COGNITION

Predictive coding

$PE = s - \hat{s}$

TTL = χ = C/L_error

Bayesian inference

$P(H|D) = P(D|H)P(H)/P(D)$

$\boldsymbol{TTL = \chi = C_prior/L_post}$

Free energy principle

$F = E - H$

$\boldsymbol{TTL = \chi = C - L}$

7. CLIMATE

Energy balance model

$C\, dT/dt = (1-\alpha)S - \varepsilon\sigma T^4$

$\boldsymbol{TTL = \chi = C/L_rad}$

Carbon cycle

$dC/dt = E - A(C)$

$\boldsymbol{TTL = \chi = C/L}$

Ocean circulation

$\partial u/\partial t + u\cdot\nabla u = -\nabla p + \nu\nabla^2 u$

$\boldsymbol{TTL = \chi = \Delta C/\Delta L}$

8. LANGUAGE

Shannon entropy

$H = -\sum p \log p$

$\boldsymbol{TTL = \chi = C_info/L_noise}$

Markov chains

$P(X_\{t+1\}|X_t)$

$\boldsymbol{TTL = \chi = C_trans/L_unc}$

Transformers

$A = \mathrm{softmax}(QK^{T}/\sqrt{d})\ V$

$\boldsymbol{TTL = \chi = C/L}$

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